

A NEW SPECIES OF *QUERCUS*  
(FAGACEAE, SECT. *LOBATAE*, GROUP *RACEMIFLORAE*)  
FROM THE SIERRA MADRE OCCIDENTAL, MEXICO

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ABSTRACT

The name *Quercus pennivenia* Trel. has been applied by many authors to an easily distinguished population of black oaks (*Quercus*, sect. *Lobatae*) from the group *Racemiflorae* that occurs in the northern Sierra Madre Occidental in northeastern Sinaloa, northwestern Durango, southeastern Sonora, and southwestern Chihuahua. The type of *Q. pennivenia* was collected south of this area and belongs to *Q. urbanii* Trel. sensu stricto. The northern population is herein named *Q. tarahumara* R. Spellenberg, J. Bacon & D. Breedlove, honoring the indigenous people whose lands this species inhabits. It is distinguished by its short and crowded pistillate inflorescences from *Q. urbanii* Trel. and *Q. radiata* Rose, both of which have long and uncrowded pistillate inflorescences. *Quercus tarahumara* usually also has denser glandular pubescence, and sparser stellate pubescence on the abaxial surface of the leaves.

RESUMEN

El nombre *Quercus pennivenia* Trel. ha sido usado por muchos autores como el nombre de una población fácilmente distinguida que localiza en el norte parte del Sierra Madre Occidental, en el noreste de Sinaloa, el noroeste de Durango, el sureste de Sonora, y el suroeste de Chihuahua. El tipo de *Q. pennivenia* fue colectado al sur de esta población y esta incluido en *Q. urbanii* Trel. sensu stricto. La población del norte esta descrito aqui como *Q. tarahumara* R. Spellenberg., J. Bacon & D. Breedlove, en referencia a las inflorescencias pistiladas breves y densas, que se sirve distinguir la especie nueva de *Q. urbanii* y *Q. radiata* Rose, ambos lo que tienen inflorescencias pistiladas largas y no compacta. *Quercus tarahumara* tambien usualmente tiene peloso glanduloso muy denso, y peloso estrellado mas disperso, en el envés de las hojas.

The genus *Quercus*, with 135–150 species occurring in Mexico (Nixon 1993a), is one of the most important genera of woody plants in the country, where it comprises a major component of the temperate woody vegetation (Rzedowski 1978). Spellenberg and Bacon determined nearly simultaneously and independently from Breedlove that a geographically discrete and morphologically recognizable series of populations of black oaks, section *Lobatae* (Nixon 1993b), in the group *Racemiflorae* (Trelease 1921, 1924), from the northern

Sierra Madre Occidental actually bears no name. These populations have been called *Q. pennevenia* Trel. by most workers (e.g., Brown 1982; Gentry 1942; Spellenberg 1992; Trelease 1924), a binomial based on a type that is best referred to *Q. urbanii* Trel. Trelease's concept of *Q. pennivenia* was confused, for the acorn clusters he illustrated for the species came from a very different black oak, *Q. mcvaughii* Spellenberg. (Spellenberg 1992).

The type of *Q. pennevenia* is based on a collection made by B. Seemann in 1849, probably on the west slope of the Sierra Madre Occidental between Mazatlan and Durango (collected as *Q. crassifolia* Humb. & Bonpl. #1968). Seemann noted that the leaves were up to one foot across (Seemann 1856). He arrived in Durango at the end of December, 1849, found the flora in poor condition because of the cold, and decided to turn south rather than heading into Chihuahua as planned (Seemann 1856). Turner (1992) provides a map showing his approximate route. McVaugh (1972) estimates that his route from Mazatlan to Durango approximates the present highway Mexico 40. Our collections from the *Racemiflorae* from near Seemann's probable route between Mazatlan and Durango indicate that *Q. urbanii* (sensu stricto) occurs there, and not the northern taxon that we herein describe (collections cited in Appendix). Breedlove has seen the type and isotypes of *Q. pennevenia* at BM, GH, K, and Spellenberg has had fragments of leaves of all species of group *Racemiflorae* (*Q. conzattii* Trel., *Q. radiata* Trel., *Q. urbanii* Trel.) compared with the holotype. The type is vegetative and in its rather pale and moderately densely stellate and comparatively sparse glandular pubescence on the abaxial surfaces of the leaves is characteristic of *Q. urbanii* and compares well with leaf material collected from trees on the Mazatlan–Durango highway. These trees also have the long racemose pistillate inflorescences characteristic of *Q. urbanii*. Leaves of trees from the northern populations herein described as a new species have a sparse stellate tomentum on the abaxial surface that exposes the dense glandular hairs, which sometimes coalesce into brownish-golden irregular droplets, the abaxial surface golden brown rather than creamy-tan or tawny as in *Q. urbanii*. The northern populations also have very short and dense pistillate inflorescences. The population from the Sierra Surutato in Sinaloa is somewhat intermediate in leaf pubescence with *Q. urbanii* to the south, but has the dense pistillate inflorescences characteristic of the new taxon here described.

Even though Trelease indicated that this new member of the *Racemiflorae* occurred as far north as eastern Sonora and western Chihuahua, apparently only one collection was available to him at the time of his description of *Q. pennevenia*. In a survey of numerous herbaria in the United States, Mexico, and Europe (A, ARIZ, ASU, B, BR, CAS, CIIDIR, DAV, DS, F, G, GH, IBUG, IEB, K, LL, M,

MA, MEXU, MO, NMC, P, PH, TEX, UC, US) the earliest collection we note is that of C. V. Hartman in Sonora and Chihuahua, a collection made before 1900. Thus, it is possible that Trelease saw material of this new taxon from the region of the Sonoran-Chihuahuan boundary, but the type he selected is based on a collection from a northern population of *Q. urbanii*. The next oldest collection was made after Trelease's monumental review (1924) and is that of H. S. Gentry in 1936. Because *Q. pennevenia* is a synonym of *Q. urbanii*, we propose a new name for the distinct northern taxon that refers to the indigenous people whose homelands this oak inhabits.

***Quercus tarahumara*** R. Spellenberg, J. Bacon, D. Breedlove, sp. nov. (Fig. 1).—TYPE: Mexico, Chihuahua, 1.25 km NW of Pinos Altos on descent into Las Baterias, elev. 2040 m, 28 Jun 1991, R. Spellenberg 10830 (holotype, NMC; isotypes, CAS, INIF, MEXU, NMC).

Arbores usque ad 3–12 altae; caules juniores dense pubescentes pilis aureis vel dilute brunneis; folia 9–25 cm longa 7–27 cm lata late obovata vel rotundata plerumque valde convexa, ad basim cordata, marginibus plus minusve integris vel 4–18 dentatis brevibus aristatis, folium omni venis 7–11 principalibus, epidermide abaxiali papillosa, plerumque dense pubescenti pilis glandulosis ochraceisque etiam sparsim pubescenti pilis stipitatis dilute brunneis, quoque pilo 3–6 ramoso contorto; inflorescentia pistillata 1–3 cm longa glandibus 2–ca. 16: cupulae plus minusve hemisphaericae 5–7 mm longae 9–11 mm latae, squamis adpressis non incrassatis basaliter pubescentibus pilis pallidis adpressis; glandes annuae ovoideae dilute castaneae 8–14 mm longae 6–8 mm latae.

*Trees* 3–12 m tall, crown round. *Trunk* 1–3 dm diameter, bark dark gray to almost black, fissured and checkered on large trees. *Branchlets* 5–9 mm diameter in the first year, covered with tawny to golden-stellate tomentum, which becomes less dense and blackens in the second and third years; lenticels slightly raised, inconspicuous. *Buds* ovoid, 6–11 mm long, 3–5 mm wide, reddish-brown, the scales broadly ovate-acuminate, appressed pilose on abaxial surface. *Leaves* persistent into the second year, pendent. *Stipules* oblong or narrowly obovate, quickly deciduous, 6–15 mm long, 3–4 mm wide, membranous, ciliate on the margins, pilose abaxially. *Petioles* tomentose, 15–77 mm long, 2–5 mm thick. *Leaf blades* usually strongly convex, thick, stiffly leathery, olive-green and sublustrous adaxially, golden-brown abaxially with glandular and stellate hairs, broadly obovate to nearly round, 9–25 cm long, 7–27 cm wide, usually about as long as wide, gradually rounded in the apical half; *apex* rounded or obtuse, rarely short-acuminate; *base* broadly and shallowly cordate; *margins* thickened, revolute, standing well above the smaller veins on abaxial



FIG. 1. Holotype of *Quercus tarahumara* (NMC).



surface, subentire or with 4–18 low aristate teeth, the aristae 0–4 mm long; *veins* 7–11 on each side, ascending at 45–90° (wider angle in basal veins) from the midrib, the proximal branching and anastomosing well within the margin, the distal passing directly into teeth or aristae, occasionally branching and anastomosing with the margin; *adaxial surface* at first with golden glandular hairs that are soon deciduous, the mature surface hard, sublustrous, glabrous except for retention of stellate hairs near larger veins and especially near base of midvein, slightly rugose by the impression of the 1° and 2° veins, the veinlets in dried leaves slightly paler and level with the intervening areolae; *abaxial epidermis* minutely papillate, usually prominently golden-glandular with vermiform hairs, and more or less stellate pubescent, the vermiform glandular hairs hiding up to 50% of the epidermis, sometimes apparently coalescing into brownish glandular droplets, and with sparse stipitate 3–6-branched hairs, the contorted branches intertangled and not obscuring the epidermis; *veins on abaxial surface* elevated, conspicuous, the 4° and smaller veinlets conspicuous and appearing paler against the background, not obscured by the stellate tomentum. *Staminate aments* 6–14 cm long; rachis sparsely villous, loosely flowered; pedicels 0–ca. 2 mm long; perianth tan, campanulate, glabrous except for the ciliate margin and a thick tuft of hairs near the base of the filaments; stamens 7–11; anthers 1.5–2 mm long, glabrous, prominently apiculate. *Pistillate inflorescences* 1–3 cm long, dense, raceme- or spike-like, with 2–ca. 16 sessile or subsessile flowers (Fig. 2). *Fruit* annual crowded in a spike-like inflorescence up to 3 cm long, ca. 2 cm wide; *cup* 9–11 mm wide, 5–7 mm long, ±hemispheric; scales reddish-brown, thin, appressed pubescent to ±glabrate, the pubescence commonly much denser near the apex; apices thin, rounded, appressed; *acorn* ovoid, 8–14 mm long, 6–8 mm in diameter, pale brown, ca. 30% included in the cup.

Common names for *Quercus tarahumara* in the region are “gueja” or “cusi gueja de la sombrilla.” On one of Gentry’s specimens from Sinaloa a common name “encino cacachilla” is recorded.

*Quercus tarahumara* has rarely been collected in flower, a fact probably contributing to its lack of earlier recognition. The few such collections indicate a flowering period from December to June. The species occurs from 1020–2200 m on igneous and presumably acid, more or less sterile reddish or pale gray epithermally or hydrothermally altered substrate, or on benches of white ashy soil not dramatically altered, along the west slope of the Sierra Madre Occidental. It extends from Municipio Temosachi in west-central Chihuahua and Municipio Yecora in adjacent east-central Sonora southward to Municipio Badiriguato in northeastern Sinaloa and Municipio Tepehuanes in northwestern Durango. *Quercus tarahumara* commonly occurs as islands among *Q. albocincta* Trel., *Q. arizonica*



FIG. 2. Variation in pistillate inflorescences in the type population of *Quercus tarahumara*: (left) fruiting clusters of holotype (NMC); (right) fruiting clusters of isotype (NMC).

Sarg., *Q. chihuahuensis* Trel., *Q. coccolobifolia* Trel., *Q. hypoleucoides* Camus, *Q. mcvaughii* Spellenb., *Q. oblongifolia* Torr., *Q. toumeyi* Sarg., and *Q. viminea* Trel. At one known locality where it occurs at its lower elevational range, Santa Rosa, Sonora, it is surrounded by dry tropical forest.

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#### APPENDIX

Specimens of *Q. urbanii* and *Q. tarahumara* examined, all from Mexico. Collections within each state are arranged alphabetically by collector.

##### Specimens of *Quercus urbanii* Examined

GUERRERO/MICHOACAN: *Langlasse 1066*, Sierra Madre, 1800 m, 20 VI 1899, (US). SINALOA: *Breedlove 44915*, Mpio Concordia, near Loberas microwave station, 4 Aug 1980, (CAS); *Breedlove 58844*, 18 Oct 1963 (CAS); *Cavagnaro 441*, Highway 40 9 mi SW of El Palmito, 4 Dec 1983, (MEXU); *Spellenberg and Bacon 11775*, Mpio. Concordia, Hwy. 40, 16 km SW of Durango state line, SW edge of Loberas, 27 Jan 1993, (CAS, CIIDIR, MEXU, NMC, NY). WITHOUT STATE CITED: *Seemann 1968*, Sierra Madre (BM [photocopy NMC], GH, K).

##### Specimens of *Q. tarahumara* Examined

CHIHUAHUA: *Allred 5403*, Puerto Gallego, 12 km SE of Cerocahui at Arroyo de las Herraduras, 12 Jun 1991, 2140 m (NMC, NMC); *5425*, Cascada Wicochi canyon E of Cerocahui, 1640 m, 13 Jun 1991 (NMC, NMC); *Breedlove 61201*, *61205*, *61206*, 10 km E of Maycoba, 1590 m, 29 Aug 1984 (CAS); *61208*, *61213*, *61214*, 29 km E of Yepachic along road to Chihuahua, 1980 m, 29 Aug 1984 (CAS); *Gentry 8051*, Rancho Byerly, Sierra Charuco, 17–25 Apr 1948 (ARIZ, MEXU, RSA), *8051a* (RSA); *Hartman 1024*, near Batopilas (without date) (GH, MO, UC, US); *Hewitt 264*, Cerro Colorado, San Gabriel Mine, 22 March 1948 (GH); *Holm s.n.*, km 38 between Ocampo and Moris, 1700 m, 25 Jun 1987 (ARIZ); *Knobloch 455*, La Bufa on Rio Batopilas, 13 Sep 1975 (CAS); *Langille 10*, Rancho Byerly, Sierra Charuco, summer 1946 (RSA); *Moore et al. 247*, *248*, Mpio. Ocampo, roadside near Ocampo near km 35, 24 Jun 1986 (NMC); *260*, Ocampo mine site, just S of Ocampo, 26 Jun 1986 (NMC); *Spellenberg 10830*, 1.25 km NW of Pinos Altos on descent into Las Baterias, 2040 m, 28 Jun 1991 (CAS, INIF, MEXU, NMC); *Spellenberg, Boecklen and Zimmerman 9830*, 15 air km NNE of Ocampo at Pinos Altos, 2100 m, 22 Jun 1989 (CAS, MEXU, NMC, NY, TEX); *9834*, 24 km NW of junction to Ocampo on road between Basaseachic and Yecora, 1950 m, 21 Jun 1989 (CAS, MEXU, NMC);

9840, 27 km W of junction of road to Ocampo with Basaseachic–Yepachic road, 1800 m, 22 Jun 1989 (MEXU, NMC); 9847, 6 km W of Yepachic, 18 km E of Sonoran border on Basaseachic–Yecora road, 1890 m, 22 Jun 1993 (MEXU, NMC); 9854, 5.5 km E of the Chihuahua–Sonora border on road between Yepachic and Maycoba, 1585 m, 23 Jun 1989 (CIIDIR, MEXU, NMC); *Spellenberg, Corral, Lebgue and Mahrt 10066*, Mpio. Ocampo, Parque Nacional de Cascada Basaseachic, 1700 m, 11 Nov 1989 (Esc. Sup. Agric. “Hermanos Escobar,” Univ. Auto. Chih., NMC); *Spellenberg and Jewell 9382*, Mpio. Moris, 6 mi W of Ocampo on the road to Moris, 1950 m, 13 Sep 1987 (CAS, Esc. Sup. Agric. “Hermanos Escobar,” INIF, MEXU, NMC); 9389, Mpio. Moris, 15 road mi W of Moris, 1524 m, 14 Sep 1987 (CIIDIR, NMC); *Spellenberg et al. 8106*, ca. 25 air mi SW of San Juanito, Maguarichi, 1 mi E of village, 28 Apr 1985 (BH, MEXU, NMC, NY); *T R and R K Van Devender and P S Martin 87-202*, 6 km WNW of Ocampo on road to baseball field, 1829 m, 25 Jun 1987 (NMC). DURANGO: *Benitez 510*, Mpio. Tepehuanes, 3 km de la Mango, 2210 m, 26 Apr 1989 (CIIDIR); *Luquin, Santana y Oruelas 267*, Mpio. Tepehuanes, comunidad de Boca de Sta. Catarina, “Frailecillos,” 2400 m, 26 Oct 1989 (CIIDIR). SINALOA: *Breedlove 16512*, 5 mi W of Santa Rita E of the Los Hornos to Surutato Road, Sierra Surutato, 1982 m, 24 Feb 1969 (CAS, RSA); 19227, Sierra Surutato, Mpio. Badiriguato, N side of Bufo de Surutato, 2195 m, 8 Mar 1971 (CAS); *Breedlove and Kawahara 16829*, Mpio. Badiriguato, Sierra Surutato, 0.5 mi N of Los Oruos, 11 Nov 1969 (CAS); *Breedlove and Thorne 18360*, Mpio. Badiriguato, Sierra Surutato, e mi N of Los Ornos along road to Ocurahui, 1982 m, 2 Oct 1970 (CAS, RSA); *Castro 2222*, Choix, Nov 1951 (MEXU); *Gentry 1983*, Rio Mayo, Tepopa, 4 Apr 1936 (MEXU); 6184, Ocurahui, Sa. Surutato, 2134 m, 27 Aug 1941, (ARIZ, CAS); *Kinnach and Sanchez-Mejorada 2085* (MEXU), 2087 (US), 22 mi past Tasajera on road to San Vicente, 1463 m, 8 Nov 1977; *Vega 2568* Mpio. Badiriguato, alrededores de Surutato, 1700 m, 11 Dec 1987 (IBUG, IEB, MEXU). SONORA: *Breedlove 61116*, 61123, 61124, 61125, 61126, 8 km SE of Trigo on road from Yecora to Sahuaripa, 1370 m (CAS); *Gentry 2226*, Rio Mayo, Tepopa, 1524 m, 4 Jun 1936 (A, ARIZ, CAS, K, MEXU, MO, UC, US); *Hartman 343*, Sierra del Nacori, 15 Dec 1890 (GH, K US); *Hernandez M. 2383*, La Joya, Taimuco, Alamos near border with Chihuahua, 10 Jun 1976 (MEXU); *Jenkins and Martin 88-247*, 3 km W of Las Chinacas at Cerro las Tinajas, 1400 m, 13 Oct 1988 (ARIZ); *Jenkins & Todd 93-43*, Mpio. de Alamos, NE of Alamos, E side of Cerro Agujudo, near Rancho Santa Barbara, 29 May 1993 (NMC); *Marshall 182*, Sa. Sagaribo, San Antonio, se Sonora, 1524 m, 28 July 1961 (ARIZ); *Martin and O'Rourke s.n.*, Santa Rosa (Yaqui River drainage), 1 km SSW of town, 1020 m, 11 May 1987 (ARIZ); *Pennell 19588*, Cerro Saquarivo, E of San Bernardo, 7 Aug 1935 (PH, US); *Spellenberg, Boecklen and Zimmerman 9866*, 9868, 4.5 km W of the Chihuahua–Sonora boundary on road between Yepachic and Maycoba, 1430 m, 23 Jun 1989 (MEXU, NMC); 9873, 13 km E of Yecora on road to Maycoba, 1460 m, 23 Jun 1989 (NMC); *Turner and Martin 79-352*, 2.5 mi by road S of Huicoche, 1540 m, 6 Oct 1979 (ARIZ).